Primer on the Matriculation Rate of European VC-backed startups

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Abstract

Venture capital has been argued to have a positive impact on the economy, particularly, job creation, and on young and innovative companies, also called startups. Many studies explored the role of venture capital on startups; however, no scientific literature is available on the dynamics of the portfolio of VCs across financing rounds. Some non-scientific literature is available for the United States, but nothing has been brought forward for Europe. Thus, in this paper we argue that understanding the funding lifecycle of startups is crucial.

This paper analyses a cohort of European-based companies that raised a Seed round between January 1, 2008 and December 31, 2010; consisting of a total of 1092 companies. The matriculation rate, which shows the percentage of venture capital-backed startups who have been able to guarantee investment after their Seed round, shows exponential decay. The model developed and used shows that the matriculation rate behaves the same in Europe and the US. Approximately 80% of European startups with a Seed round of investment fail to ensure subsequent rounds.

In parallel, the paper also analyzes attributes of the companies in the cohort. The United Kingdom, Germany and France are the European countries with most startups ensuring Seed rounds. The paper shows that more than 50% of venture capital-backed European startups have up to two founders. Finally, the paper reinforced that managing to gather a Seed round has been more common over the past years.

Keywords
Venture Capital, startups, matriculation rate, entrepreneurship, innovation.

1. Introduction

Venture capital (VC) plays a central role in the growth and value creation of startups and young companies (mainly SMEs), as well as in supporting and stimulating entrepreneurs. (Quadros Brito 2020) Access to financial resources has been reported as a critical aspect of entrepreneurial success which, in turn, is generally argued to be an important part of economic systems' efficiency and one of the main engines of economic growth. (Grilli et al. 2017) Similarly, the European Investment Fund (EIF) found that, on average, VC-backed startups grow faster than non-VC-backed startups. These findings further support the benefits of VC. (Crisanti All available evidence points toward a positive impact of VC on economic performance at a micro and macro-level. [(Samila and Sorenso, 2011), (Kortum and Lerner, 2000) and (Puri and Zarutskie, 2012)] With this in mind, several countries have considered growth-oriented entrepreneurship a political priority due to its role in increasing productivity, innovation and job creation (Lunati et al., 2010). Thus, VC is relevant, not only for young and innovative companies, but also for economies as a whole, at a national, regional and communitarian level. (Grilli et al. 2017) The value of VC to new innovative ventures is easily explained by the fact that these are, often, capital-constrained and cannot offer tangible collateral to traditional capital providers, such as banks. The information asymmetry leading to this phenomenon (i.e. uncertainty perceived by traditional capital providers aggravated by the lack of credibility and track record of entrepreneurs) has led to the establishment of VCs firms as specialized financial intermediaries. (Grilli et al. 2017) In short, Venture Capitalists (VCs) created a market for entrepreneurs who needed funding, investment bankers who looked for companies to sell and investors who wanted high returns. [(Gompers and Lerner, 2001) and (Zider, 1998)].

As stated above, several studies on entrepreneurship, innovation, economics and, specifically, VC have explored the role of VC on the performance of startups and the factor impacting the success of startups in receiving investment. [(Quadros Brito 2020) and (Cruz e Silva, 2015)] In fact, apart from the United States (US), VC has only moderately developed in most regions and countries. Europe is not an exception since, very few countries have succeeded to develop the VC industry. Vast research has been undergone to understand the antecedents, barriers and facilitators of the industry, and the variations of the degree of development and performance of the industry. [(Grilli et al. 2017) and (Saura et al. 2019)] However, very little is known about the dynamics of the portfolio of VCs across financing rounds, particularly in Europe as the only existing evidence, of questionable scientific validity due to the fact that it is not published on any scientific journal, pertains to the US. This is particularly relevant when taking into account that Europe has several VC investment opportunities with more small and medium enterprises per unit of gross domestic product than anywhere else in the world. (Botsari et al., 2018) Furthermore, it is widely known and advertised that most startups fail [(Gravagna and Adams, 2013) and (Portal, 2018)]. Even so, very little scientific evidence is available on why this happens and what can founders expect after raising their first round of investment. Understanding the funding lifecycle of startups is, therefore, of the essence to better understand where they start losing traction and, eventually, fail.

The matriculation rate is an indicator shedding light on the dynamics of VC's portfolios and the funding lifecycle of startups. The matriculation shows the percentage of VC-backed startups, who have been able to guarantee seed investment, ensuring subsequent funding rounds. In other words, it is the rate stage conversion. Despite its potential, and in line with the previously stated, very little is known about the matriculation rate of startups, especially in the European context (Rowley, 2016). This paper intends to further understand the VC industry, in particular, the behaviour of the matriculation rate of European VC-backed companies and explore how company attributes behave in relation to the matriculation rate.

2. State of the art

An extensive literature review found that there are only three works studying the matriculation, all of them with a focus in the US. These studies are only valid for the American ecosystem and none was published on a scientific journal. A CB Insights Research Portal study made in 2018 analysed a cohort of over 1100 tech companies that raised their first round of seed funding in 2008, 2009, or 2010. This study followed the cohort through to August 31, 2018 and concluded that only 48% of companies managed to secure a second round of funding. The percentage is lower for further rounds of funding as only 15% managed to raise a fourth round of funding, as seen in Figure 1 (Portal, 2018).
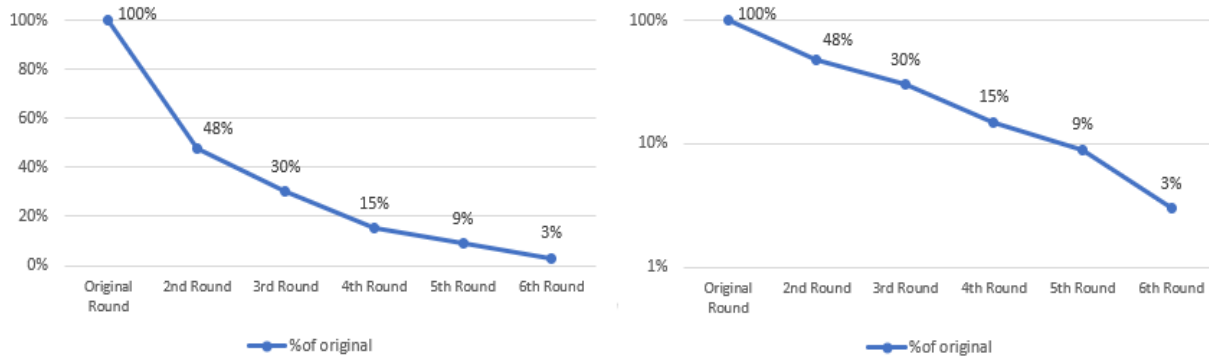
Figure 1. Matriculation Rate for VC-backed US tech companies. Cohort 2008-2010. Linear scale represented on the left. Logarithmic scale represented on the right. Based on (Portal, 2018).

In 2016, Rowley analysed 2011 US software companies that managed to be Seed-funded between January 1, 2009 and December 31, 2012. The drop-off rate was found to also be pretty steep and a closer analysis shows exponential decay. From the companies in the cohort, only 31% will raise a second round of funding, as seen in Figure 2. The author hypothesises that the drop-off rate might be steeper for companies that raised after 2011, as the cohort had less time to mature. To reduce this potential error, this study considers that the last round raised is the "terminal stage" of the startup (Rowley, 2016).
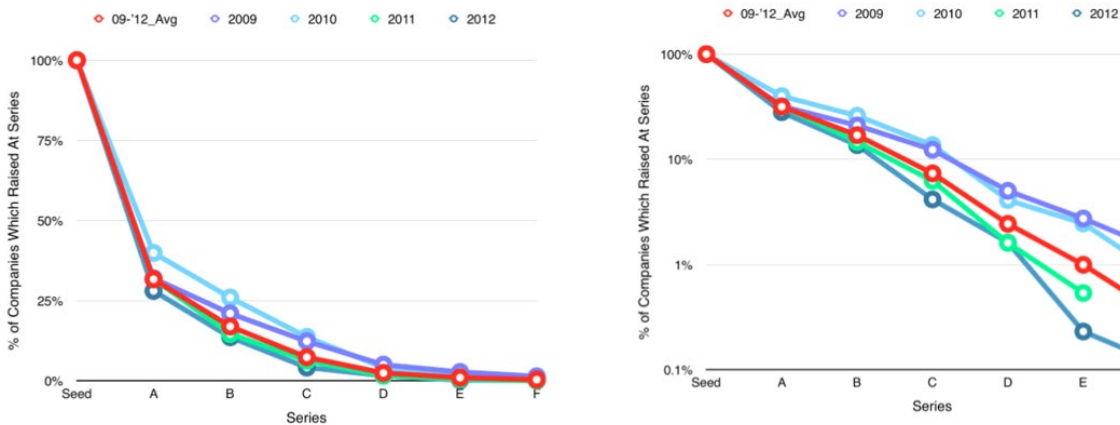

Figure 2. Matriculation Rate for VC-backed US software companies. Cohort 2009-2012. Linear scale represented on the left. Logarithmic scale represented on the right. (Portal, 2018)

In 2017, Rowley studied a cohort of around 15600 US-based technology companies founded between 2003 and 2013. By analysing the steep startup matriculation rate curve, shown in Figure 3, the author concluded that roughly 40% of companies that raise a Seed round able to raise a Series A. The exponential decay in the number of startups that move through the fundraising cycle is clear, with only 1% of companies having successfully raised a Series F (Rowley, 2017).
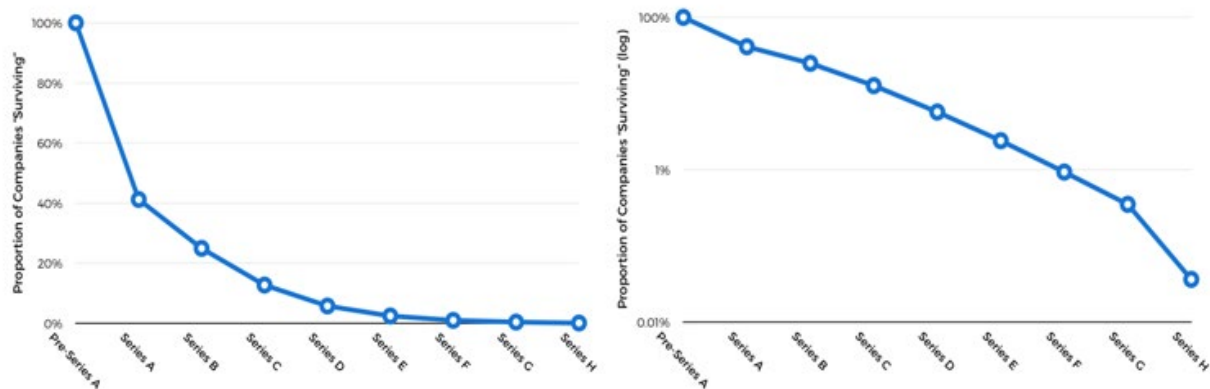
Figure 3. Matriculation Rate for VC-backed US tech companies. Cohort 2003-2013. Linear scale represented on the left. Logarithmic scale represented on the right. Based on (Rowley, 2017).

The existing state of the art seems to indicate that the fundraising cycle is subject to exponential decay and that, roughly, only between 30% to 40% of companies that raised a seed round are able to secure a series A. Once again, this data pertains to the US and, as such, much caution is needed in interpreting these results as they may not reflect other geographies. A closer analysis of the state of the art also indicates that the vertical of VC-backed startups may impact the matriculation rate (i.e. differences between tech companies and software companies in particular).

Several reasons are often given for startups inability to raise subsequent rounds of funding, reflected in the exponential decay seen in the matriculation rates of the studies above. Three reasons seem to stand out, such as the company being acquired, reaching financial sustainability or the team breaking up or running out of money. It is posited that the initial drop-off rate (from seed to series A) is due to running out of money and/or the team breaking up, whilst the drop off rate in later stages, from Series A onwards, is mostly driven by reaching financial sustainability and/or being acquired (Rowley, 2016). However, this has not been proven or studied in detail, thus reinforcing the existence of a gap in the literature.

3. Methods

The Matriculation Rate Model was developed following the same methodology mentioned above (Portal, 2018). The cohort consists of all European-based companies that raised a Seed round between January 1, 2008 and December 31, 2010 and consists of a total of 1092 companies. The period was chosen because it is close enough to today to make the finding actionable and long enough ago that the companies had time to set their trajectory (Rowley, 2016).

The model was developed, using Microsoft Excel, as a data processing tool, in order to facilitate data analysis and data processing. Additional attributes of the companies in the cohort were selected according to the state of the art and Crunchbase's database available data. These attributes were analysed in an initial attempt to identify the factors affecting or dependent upon the matriculation rate.

Quantitative data were analysed statistically by building matriculation rate tables with a count for companies on each funding stage. This data was then translated into frequency tables. With this information, the matriculation rate figures, similar to those presented and analysed from existing literature, were built rapidly allowing to see and analyse the matriculation rate by year as well as an average between 2008-2010. The logarithmic scale was also applied in order to check if the behaviour of the matriculation of European VC-backed companies also showed exponential decay across the fundraising cycle. The SPSS software was used to allow comparisons between some of the potential factors. Regarding missing data, all blank cells were classified as "N/A". For this analysis, we assumed that a company raising a specific round of funding had secured all previous rounds. The matriculation rate was studied for each year independently and the cohort as a whole. However, for this first analysis, the potential factors were studied and analysed for the cohort.

The results for each potential factor, how they behave and how they are related to the matriculation rate are then compared to the state of the art. This methodology allows for a primer on the matriculation rate of European VC-backed startups and a comparison with US counterparts.

4. Results

Table 1 provides a clear view of the count of companies across different funding stages in the cohort analysed. As shown, 1092 companies have received at least a seed round of funding between 2008 and 2010. From these, only 217 companies have managed to secure a second round of funding (Series A). Out of these, only, 118 were able to secure a Series B. This diminishing trend continues, as only 51 companies out of the t are able to secure a Series C. From these, only 16 manage to secure a Series D. The drop-off rate is clear, especially considering that, out of 1092 companies, only 5 manage to secure a Series E.

Table 1. Total Number of Companies. Cohort 2008 - 2010, Cohort 2008, Cohort 2009 and Cohort 2010.

Serie	Seed	A	B	C	D	E
Total Number of Companies 08-10	1092	217	118	51	16	5
Total Number of Companies 08	279	48	28	14	1	0
Total Number of Companies 09	331	73	41	17	5	1
Total Number of Companies 10	525	113	58	26	10	3

The numbers of each individual cohort also display a drop-off rate. The number of companies that can secure a Seed round increases from 2008 onwards, which was expected since seed rounds have been on the rise since 2008 [(Portal, 2018) and (Rowley, 2016)].

A simple transformation of the data on Table 1 into percentages, where the number of companies in the Seed round corresponds to 100%, reinforces the existence of a steep drop-off rate, as shown in Figure 4. This data shows that only, roughly, 20% of the companies receiving seed funding are able to secure a Series A. As previously stated, this drop-off rate remains across next funding stages as only 10,81%, 4,67%, 1,47% and 0,46% of companies in our cohort can secure a Series B, C, D and E, respectively.
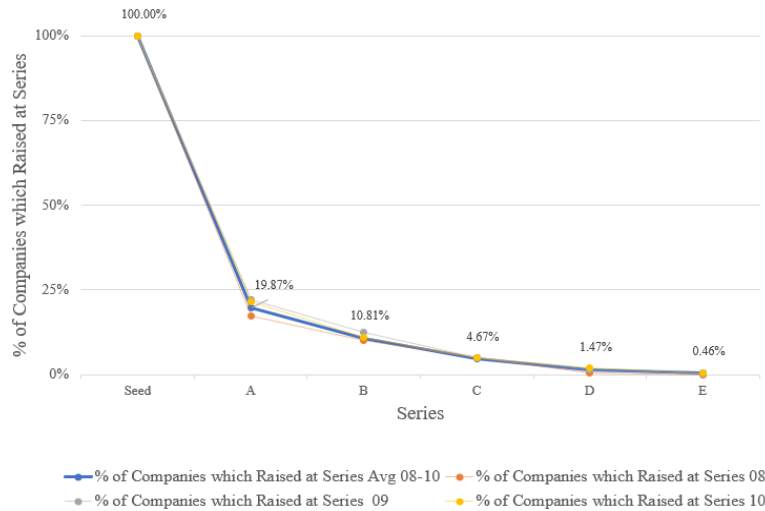

Figure 4. Matriculation Rate for VC-backed European companies. Cohort 2008-2010. Linear scale.

Applying a logarithmic scale shows, as expected, and in line with the existing literature for the US, exponential decay in the matriculation rate of European VC-backed companies.
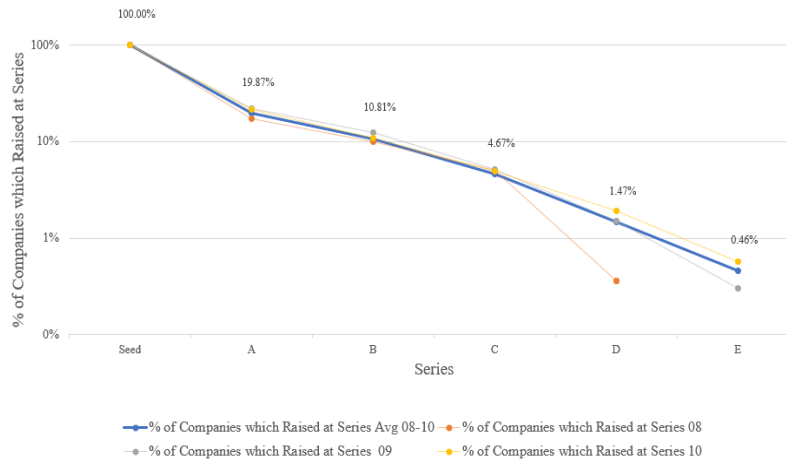
Figure 5. Matriculation Rate for VC-backed European companies. Cohort 2008-2010. Logarithmic scale.

Several company attributes can be related to the matriculation rate. In this paper we will describe, briefly, two that we considered could be of particular interest. These are the headquarters location of the company and the number of founders.

Within our cohort, the top three countries with companies that managed to get the first round of funding are the United Kingdom (26.8 % of the cohort), Germany (18.9 % of the cohort) and France (9.5 % of the cohort), as seen in Figure 6. On the other hand, the three countries with fewer companies managing to secure the first round of funding are Slovenia (0.18 % of the cohort), Liechtenstein (0.09 % of the cohort) and Malta (0.09 % of the cohort).

Table 2. Headquarters Location. Cohort 2008-2010.

Headquarters Location	#	Headquarters Location	#	Headquarters Location	#
United Kingdom	293	Turkey	17	Romania	4
Germany	207	Belgium	16	Belarus	3
France	104	Poland	16	Cyprus	3
Spain	89	Denmark	14	Hungary	3
The Netherlands	42	Norway	12	Luxembourg	3
Ireland	39	Portugal	10	Czech Republic	2
Sweden	35	Estonia	9	Lithuania	2
Russian Federation	31	Ukraine	8	Moldova	2
Switzerland	29	Iceland	7	Slovakia (Slovak Republic)	2
Italy	27	Greece	5	Slovenia	2
Finland	26	Latvia	5	Liechtenstein	1
Austria	19	Bulgaria	4	Malta	1

Figure 6 shows the headquarters location distribution of companies in the cohort. Countries that are not coloured do not have any representation in the cohort.

Figure 6. Headquarters distribution of the companies in the cohort.

The number of founders in a company can vary, as shown in Figure 7. In our cohort, 29 % (315 companies) had one founder, 21 % (228 companies) had two founders and 12 % (132 companies) had three or more founders. Most companies in the cohort have up to two founders (at least 50 %), as it is viable to assume that within the 38 % of companies without information, there might exist companies stemming from solo entrepreneurs or teams of two founders.
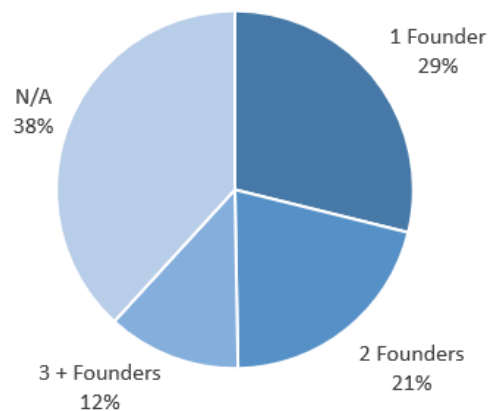

Figure 7. Number of Founders of European Seed-Raised Companies. Cohort 20082010.

The Matriculation Rate Model also allow us to analyse the operating status of the cohort. The operating status tells us if the companies are still active or if they have closed. From the 1092 companies analysed, 951 (87.1 % of the cohort) are still active and the remaining 141 (12.9 % of the cohort) are closed, according to Crunchbase data.

5. Discussion

The matriculation rate behaviour for the cohort of European companies studied shows the same behaviour as the ones presented for the US reality, both having a steep drop-off rate and showing exponential decay. As it is possible to see when comparing Figure 4 and Figure 5, the drop off rate is higher for the Seed-Series A round on our cohort than it is in the ones representing the US reality. This might be explained by the fact that the VC industry was born in the US, being the ecosystem more developed than the European one (Crisanti et al. 2019), (Grilli et al. 2017). Moreover, the chosen cohort, between 2008 and 2010, is when the VC industry around the world started having big developments (Portal, 2018) leading to an increase of VC-backed companies.

The fact that the United Kingdom, Germany and France are the top three countries with more companies managing to gather the first round of funding and that Slovenia, Liechtenstein and Malta are the countries with fewer companies securing the first round of funding, as seen in Figure 6, might be related to the ecosystem maturity level. More specific issues might also be drivers of this behaviour, such as the gross domestic product, the tax system and/or the existence of fiscal benefits. It can also be related to the size of the countries, which might lead to some countries having overreporting when compared to smaller ones.

From the available data, more than 50% of VC-backed European companies have up to two founders. Taking an overlook at the cohort, the fact that 87.1 % of companies still have an active operating status might indicate that either the companies haven't been able to exit, or that the information of the database hasn't been updated. On the other hand, 12.9 % of companies are closed, which reinforces existing literature.

These potential factors and their relationship with the matriculation rate is something that could provide important insights on entrepreneurial ecosystems and, as such, should be further studied.

Managing to gather a Seed round of funding has been increasingly more common over the past ten years [(Portal, 2018) and (Rowley, 2016)]. To a certain extent our data corroborates existing literature as it shows that, in Europe, the number of companies managing to gather a Seed round of funding increased yearly from 2008 to 2010. Between 2008 and 2009 the number of seed-funded companies increased, roughly, 19% and between 2009 and 2010 it increased, roughly, 59%.

6. Conclusions

This study is of key importance as it shed light on the reality for European VC-back startups. As mentioned before very little is known about this topic. Europe's VC ecosystem is growing and becoming of crucial importance for policy makers, impacting innovation, jobs and overall economic growth (Crisanti et al. 2019).

Comparing the matriculation rate of the cohort studied with more recent data regarding the European ecosystem might allow for further conclusions regarding the role of the industry's maturation in the matriculation rate.

The Matriculation Rate Model showed that the matriculation rate behaves the same in Europe and the US. This might be an interesting insight for investors interested in VC and willing to diversify their portfolio across regions. This strategy could lead to more diversified portfolios with investors being less exposed to regional macro-economic questions.

Having all the above in consideration, the economic, political and strategic value of the matriculation rate becomes evident. There are clear differences among the European ecosystem when it comes to being able to gather the first round of investment. These differences can have different causes, as explained above. Nonetheless, developing a stable and attractive ecosystem, that attracts more people and increases investment potential, should become a key priority for European governments.

Initiatives and proposals aiming at improving and developing the ecosystem should account for the fact that, in Europe, most startups have up to 2 founders. This is of extreme relevance for all players of the ecosystem: entrepreneurs, investors, corporations, universities, governments and support organizations.

Further research could be done by analysing the matriculation rate of software companies within the cohort to compare results with a similar analysis made in the US, as presented in the state of art section.

There is also the possibility of minor errors related to data omission, as some companies may have raised subsequent rounds of funding which are not recorded by Crunchbase or labelled correctly.

Analysing the matriculation rate for the number of founders and the headquarters locations, as well as the relationship between the company attributes and the matriculation rate itself, could be insightful to further understand the VC industry in Europe.

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8. Biographies

Marta Quadros Brito is an Industrial Engineering and Management student at NOVA School of Science and Technology, having completed her bachelor's degree and currently on the last phase of completing her master's. The topic of this paper was based on her master thesis. She is passionate about engineering and management, specifically in the areas of innovation, venture capital and business development.

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António Grilo, holds a PhD degree in Industrial Management by the University of Salford, UK. He is an Associate Professor of Industrial Engineering and Management with Habilitation at the Faculdade Ciências e Tecnologia da Universidade Nova de Lisboa, in doctoral, master and undergraduate degrees. He is also the Director of the research centre UNIDEMI. He has over 100 papers published in international conferences and scientific journals.